LLNL
Environmental Restoration Division (ERD)
Standard Operating Procedure (SOP)

ERD SOP 1.8: Disposal of Investigation-Derived Wastes (Drill Cuttings, Core Samples, and Drilling Mud)

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1.0 PURPOSE

To ensure that investigation-derived waste (IDW) consisting of drill cuttings, unused core samples, and drilling mud/initial muddy development water from Site 300 and Livermore Site are properly disposed of in a manner consistent with the protection of human health and the environment using the guidance provided by Reference 3.12 below. This guidance states that "the management of investigation-derived wastes (IDW) must ensure protection of human health and the environment and comply with certain applicable or relevant and appropriate requirements (ARARs)." The guidance further states that "as a general rule, it will be necessary to use best professional judgment, in light of the site-specific conditions, to determine whether an option is protective of human health and the environment." The following SOP reflects LLNL's evaluation of ARARs and its best professional judgment concerning the management of investigation-derived drill cuttings, core samples, and drilling mud.

2.0 APPLICABILITY

The following procedure and information is applicable to all activities which can generate investigation-derived wastes (i.e., drill cuttings, core samples, and drilling mud/initial muddy development water). The following sections describe the handling, screening and disposal of drilling wastes containing: volatile organic compounds (VOCs), petroleum products, metals, tritium, uranium, and high-explosive (HE) compounds.

3.0 REFERENCES

3.1 10 CFR 61.55.8-40-112 and 8-40-205 BAAQMD, Bay Area Air Quality Management District (Revised draft 1/11/89) Regulation 8, Organic Compounds Rule 40 Aeration of Contaminated Soil and Removal of Underground Storage Tanks.

3.2 California Regional Water Quality Control Board–Central Valley Region (1992), *Water Quality Control Plan (Basin Plan) For the California Regional Water Quality Control Board Central Valley Region*, Second Edition.

3.3 California Regional Water Quality Control Board–San Francisco Bay Region (1982), *Water Quality Control Plan (Basin Plan), San Francisco Bay Basin, State of California*, Oakland, CA.

3.4 Carlsen, T. M., Ed. (1991), *Lawrence Livermore National Laboratory Site 300 Environmental Investigations Quarterly, April-June 1991*, Lawrence Livermore National Laboratory, Livermore Calif. (UCAR-10194-91-2).

3.5 Crow and Lamarre (1990), *Remedial Investigation of the High-Explosives (HE) Process Area*, Lawrence Livermore National Laboratory Site 300 (UCID-21920).

3.6 Foxboro Company (1985), Instruction Manual Foxboro Model 128 Century Organic Vapor Analyzer, M1 61 1-132.

3.7 Hoffman, F. and M. D. Dresen (1990), "A Method to Evaluate the Vertical Distribution of VOCs in Ground Water in a Single Borehole," *Ground Water Monitoring Review*, Spring 1990, 10(2), 95-100.

3.8 Isherwood, W. F. (1994), letter to Vincent Chrisitian, California Regional Quality Control Board, San Francisco Bay Region (2), regarding using soils concerning trace levels of contaminants as fill, dated November 18, 1994.

3.9 Jackson, C. S. (1995), letter to Vincent Chrisitian, California Regional Quality Control Board, San Francisco Bay Region (2), regarding beneficial reuse of soils containing metals slightly exceeding background values, dated July 24, 1995.

3.10 Marshack, J. B. (1989), *The Designated Level Methodology for Waste Classification and Cleanup Determination*, California Regional Water Quality Control Board—Central Valley Region.

3.11 409.9 SJCAPCD, San Joaquin County Air Pollution Control District (1988), *RULE 409.9 Volatile Organic Compound Emissions from Decontamination of Soil* (Adopted Nov. 29, 1988, Effective July 1, 1989).

3.12 State of California Leaking Underground Fuel Tank Task Force (1988), *Leaking Underground Fuel Tank (LUFT) Field Manual.*

3.13 Title 22, California Code of Regulations, Chapter 11, Section 66261.24 (Register 95, No. 42; 10-20-95) and Appendix 11 (Register 95, No. 21; 5-26-95).

3.14 Title 22, California Code of Regulations, Chapter 18, Section 66268.40 (Register 95, Nos. 7-8; 2-24-95) and (Register 92, Nos. 15-17; 4-24-92).

3.15 U.S. Environmental Protection Agency (EPA) (1991), *Guide to Management of Investigation-Derived Wastes*, U.S. EPA, Office of Solid Waste and Emergency Response, Publication 9345.3-03FS, October 1991.

4.0 DEFINITIONS

See SOP Glossary.

5.0 RESPONSIBILITIES

5.1 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.2 Hydrogeologic Group Leader (HGL)

The HGL's responsibility is to ensure that proper procedures are followed for activities (i.e., drilling, borehole logging and sampling, monitor well installations and development) and to oversee the disposal of all investigation derived wastes.

5.3 Drilling Supervisor (DS)

The DS schedules all drilling related activities and coordinates the drilling contractor schedules and equipment needs.

5.4 Drilling Coordinator (DC)

The DC provides the interface between the DS and the field activities and is responsible for estimate the contaminants likely to be present, and the quantity of drilling spoils that may be generated.

5.5 Drilling Geologist (DG)

The DG is responsible for disposing investigation derived waste properly per the requirements of this SOP.

5.6 Engineering Group

The Engineering Group is responsible for determining a disposal area.

5.7 Task Leader (TL)

The TL are responsible for the overall investigation, planning, assessment, and remediation within a study area.

6.0 PROCEDURE

6.1 Discussion

6.1.1 According to available guidance (Reference 3.15), the EPA expects soil IDW to be returned to the source if short-term protectiveness of human health and the environment is not an issue. Therefore, in the long term, the IDWs that could pose a risk to human health and the environment will be addressed by the final action. Unfortunately, it is often impossible to return drill cuttings and cores back to the borehole when the borehole is completed as a well. Thus, a review of ARARs was conducted to determine the best disposal methods for such IDW. Also, State law allows Regional Boards to waive waste discharge requirements (WDRs) for a specific discharge or types of discharges where it is not against the public interest [California Regional Water Quality Control Board (RWQCB) 1992]. As listed in Table IV-1 of the Central Valley Region Basin Plan, drilling mud is one type of discharge which has a WDR waiver. The specific procedures related to drilling mud are discussed later in this SOP.

6.1.2 Attachment A lists ARARs that may be applicable to drill cuttings, core samples, and drilling mud. Attachment A also describes actions taken to comply with substantive portions of each regulation, as required by EPA, 1991. As a result of our review of these ARARs, we feel the best management practices are observed when drill cuttings are disposed of in the immediate vicinity of the drilling activity. However, due to programmatic constraints at the Livermore Site, it is often not possible to dispose of drill cuttings in the vicinity of the boreholes. Therefore, drill cuttings are disposed of at the designated Drilling Cuttings/Laydown Area on site.

6.1.3 Chemical analyses on drilling wastes are usually performed in areas of known or suspected contamination or in previously unexplored areas. Drilling wastes from areas with an extensive historical record of sampling and chemical analyses that detected no chemical contamination are generally not chemically analyzed.

6.1.4 The disposal criteria in this procedure were developed to ensure that no wastes, which are above the Resource Conservation and Recovery Act (RCRA) hazardous waste levels, or waste with specified levels (described below) of HE or radioactive contaminants are disposed of on the ground surface near the borehole. When necessary, LLNL Hazardous Waste Management Division (HWM) will dispose of investigation-derived hazardous wastes.

6.2 Preparation

6.2.1 Estimate contaminants, concentrations, and quantity of waste for planning the proper disposal method for the IDW, excavation of the proper size mud pit (when applicable), and mud transportation capacity (when applicable).

6.2.2 Determine location for placement of drill cuttings or installation of pit to contain drilling mud. For Site 300, when drilling off site, haul drilling spoils to a designated area on site determined by the Site 300 Environmental Analyst (EA) and Site Manager. Drill cuttings and mud pit should not be visible from a road. If drilling is performed on a hill, ensure that no stream of water or drilling mud will flow down the hillside. If drill cuttings or mud cannot be hidden from view due to the proposed drilling location, consult the DC, EA, Engineering Group, and Site Manager. At the Livermore Site, contact the Engineering Group to determine disposal locations. Usually, drilling spoils will be disposed of at the Drill Cuttings/Laydown Area.

6.2.3 Construct mud pit (as determined by 6.2.2):

A. Scrape off the top 1 to 2 ft of soil and save for restoration phase.

B. Install an animal escape ramp into pit as soon as it is excavated. The ramp should be repositioned each evening to ensure an adequate escape route. Place a barrier around the pit to prevent any animals or people from inadvertently walking into the pit.

6.2.4 Perform the applicable preparation activities described in SOP 4.1, “Instructions for Field personnel” (i.e., calibrate field equipment, don PPE).

6.3 Drilling Waste Containment

6.3.1 Air-mist or Mud-rotary Drilling (Site 300 On-site). Place drilling waste in the approved mud pit location.

6.3.2 Air-mist or Mud-rotary Drilling (Livermore Site On and Off-site and Site 300 Off-site). Place all drilling waste in a container(s) for transport to disposal area.

6.3.3 Auger Drilling (Livermore Site and Site 300 On-site). Place drill cuttings on plastic sheeting placed on the ground or in containers until transport to disposal area.

6.3.4 Auger Drilling (Livermore Site and Site 300 Off-site). Place all drilling waste in a container(s) for transport to disposal area.

6.3.5 If contaminant type(s) or concentrations are suspected or determined in drilling spoils to be hazardous, the drilling wastes should be segregated by depth to isolate the spoils from the contaminated zones. These spoils should be placed on plastic or in hazardous waste drums.

6.4 Screening of Drilling Waste

6.4.1 Screen core samples or cuttings using a photoionization detector (PID) or flame ionization detector (FID) meter approximately every 5 ft of drilling, or at a

reduced permeability interface where there is a likelihood of contaminant accumulation (volatile compounds only).

6.4.2 For mud-rotary drilling techniques, collect aliquots of drilling mud from the mud tank or trailer for field PID or FID meter screening prior to disposal. Screen each load of the mud separately (volatile compounds only).

6.4.3 If VOC contamination of the drilling spoils is encountered (10 $ppm_{v/v}$), segregate the spoils from the previously clean spoils, and increase the frequency of screening as directed by the DG. Collect samples of the spoils and submit for laboratory analysis.

6.4.4 Screening Method for VOCs using an PID or FID:

1. Collect enough drilling waste (drilling mud or cuttings) to fill two 40 ml vials (or equivalent containers).

2. Immediately empty the two vials into a new, clean plastic bag. Capture approximately 1 liter of air in the bag before sealing. Shake the bag well. Then place the bag on a stationary surface (in the sun, if possible) to allow the headspace to come into equilibrium with the waste. The length of time the headspace is allowed to equilibrate will depend on ambient temperature and humidity conditions; 2 minutes if temperature is >90° F, at least 5 minutes if >70° F, 10 minutes if 70° to 50° F, and 15 minutes if <50° F. In extremely hot conditions, if the bag is allowed to sit too long, a buildup of water vapor in the bag may affect a PIDs performance. An FID should not have any negative effects from water vapor.

3. Insert the tip of the PID or FID probe into the headspace of the plastic bag by piercing it with the probe. Avoid making contact with mud, soil, or water with the instrument tip to prevent these materials from being sucked into the instrument.

4. Read the meters' display to obtain a total VOC concentration of the headspace in parts per million on a volume to volume basis ($ppm_{v/v}$).

5. Record this reading on the borehole well construction form, and refer to the criteria below for disposal.

6.4.5 When radiological contamination is suspected, notify the Environmental Safety and Health [ES&H] Team 1 (Site 300) or Team 4 (Livermore Site) prior to drilling. Survey the drill cuttings as directed by Team 1 or Team 4. When the screening method detects activity two times the background level, collect samples for laboratory analysis per the TL. Tritium should be analyzed by either LLNL Environmental Sciences or a contract analytical laboratory using the "Soil Water Distillation" technique (detection limit is between 200 to 1,000 pCi/L or 0.02 to 0.1 picocuries per gram [pCi/g] at 10% moisture) or the "Beta Scan" technique (detection limit is approximately 10,000 pCi/L or 1.0 pCi/g at 10% moisture). Provide the analytical results from the samples taken when the screening method detected activity twice the background level, to the LLNL HWM Division and the appropriate EA to determine the appropriate method of waste disposal.

6.5 Disposal of Drilling Waste

The following disposal procedures are to be used only when there is sufficient historical data that delineates contaminants and their concentrations. If no historical data is available, a variety of analyses, as determined by the TL should be performed first to ensure that all potential contaminants in the wastes are understood for proper disposal.

6.5.1 Disposal procedure for waste containing VOCs:

TCE is the predominant purgeable halocarbon contaminant at Site 300 and the Livermore Site. The U.S. EPA Toxic Concentration Leachate Procedure (TCLP) maximum contaminant concentration of 0.5 mg/L in the resulting extract has been selected for our disposal criteria. Using the TCLP, soluble constituents in a soil sample are extracted using a 20:1 dilution (by weight). In order to insure that the extract concentration of TCE does not exceed 0.5 mg/L, a value of 10 mg/kg is the disposal criteria above which the soil will be dealt with in a manner to ensure maximum environmental protection as described below.

A. Drilling waste <10 mg/kg total VOCs:

Dispose of drill cuttings (1) at the ground surface near the well site, (2) as fill, or (3) in the designated disposal area. If cuttings are disposed of near the well site, spread cuttings out as much as is practical. When appropriate, discharge drilling mud to a pit or sump with a minimum of 2 ft of freeboard (Site 300) or 1 ft of freeboard (Livermore Site). For off-site drilling activities, transport drill cuttings and mud on site for disposal in the designated disposal area.

B. Drilling waste >10 mg/kg total VOCs:

Place drill cuttings temporarily on plastic sheeting at well site or Corp. Yard in a 6-in. lift to promote aeration and reduce VOC concentrations. Discharge drilling mud directly to drums, or leave temporarily in mud tank or trailer. After drilling completion, re-evaluate the spoils VOC concentration. If concentrations remain above 10 mg/kg, dispose of the waste appropriately as determined by HWM, in consultation with the appropriate EA.

6.5.2 Disposal procedure for waste containing total petroleum hydrocarbons (TPH), gasoline or diesel product:

The Leaking Underground Fuel Tank (LUFT), Field Manual (3.12) sets a TPH concentration of 1,000 mg/kg in soil as a hazardous waste classification criterion and suggests that a lower value may be necessary on a case-by-case basis. The Bay Area Air Quality Management District (BAAQMD), San Joaquin County Air Pollution Control District (SJCAPCD), and Alameda County define TPH-contaminated soil as a soil that exhibits 50 mg/kg by weight TPH, but they exempt soil that is removed for sampling purposes (409.9 SJCAPCD; and 8-40-112 and 8-40-205 BAAQMD).

A. Drilling waste <100 mg/kg TPH (equivalent to 10,000 $ppm_{v/v}$ on the OVM):

Dispose of drill cuttings (1) at the ground surface near the well site, (2) as fill, or (3) in the designated disposal area. If cuttings are disposed of near the

well site, spread cuttings out as much as is practical. When appropriate, discharge drilling mud to a pit or sump with a minimum of 2 ft of freeboard (Site 300) or 1 ft of freeboard (Livermore Site). For off-site drilling activities, transport drill cuttings and mud on site for disposal in the designated disposal area.

B. Drilling waste >100 mg/kg TPH:

Store drilling waste on site covered with plastic sheeting or in drums until a determination on the feasibility of enhanced soil bioremediation (ESB) is made by the TL. If ESB is to be used, transport the waste to the ESB site and follow steps below. If ESB is not feasible, treat and/or dispose of the waste appropriately as determined by HWM, in consultation with the appropriate EA.

l. Spread soil to a thickness of 6 to 12 inches.

2. Water weekly and biweekly.

3. Till soil and fertilize as necessary

Note: Details on the ESB can be found in Reference 3.4.

6.5.3 Disposal procedure for waste containing metals:

A. Drilling waste below Soluble Threshold Limit Concentrations (STLCs):

Dispose of drill cuttings (1) at the ground surface near the well site, (2) as fill, or (3) in the designated disposal area. If cuttings are disposed of near the well site, spread cuttings out as much as is practical. When appropriate, discharge drilling mud to a pit or sump with a minimum of 2 ft of freeboard (Site 300) or 1 ft of freeboard (Livermore Site). For off-site drilling activities, transport drill cuttings and mud on site for disposal in the designated disposal area.

B. Drilling waste above STLCs:

Dispose off site as hazardous waste through HWM.

6.5.4 Disposal procedure for waste containing tritium:

At present, no Federal or State hazardous waste guidelines exist for tritium in soil. The most pertinent guideline is the classification threshold for tritium concentration as a Class A solid waste at 40.0 curies per cubic meter (10 CFR, Section 61.55). This value is approximately equivalent to 40,000 microcuries per liter (mCi/L) or 40,000,000,000 picocuries per liter (pCi/L).

A. Drilling waste below “Beta Scan” Practical Quantitation Limit (PQL); 1 pCi/g or a Lab counting of <5 pCi/g:

Dispose of drill cuttings (1) at the ground surface near the well site, (2) as fill, or (3) in the designated disposal area. If cuttings are disposed of near the well site, spread cuttings out as much as is practical. When appropriate, discharge drilling mud to a pit or sump with a minimum of 2 ft of freeboard

(Site 300) or 1 ft of freeboard (Livermore Site). For off-site drilling activities, transport drill cuttings and mud on site for disposal in the designated disposal area.

B. Drilling waste above "Beta Scan" PQL or a Lab counting of >5 and <60 pCi/g:

If tritium contamination is known or expected to be encountered within a particular zone, segregate the spoils to minimize the quantity of spoils and dispose of as determined by HWM, in consultation with the appropriate EA.

C. Drilling waste results >60 pCi/g:

Dispose of mud or cuttings as radioactive waste determined on a case-by-case basis by the ECBGL in consultation with HWM and the appropriate EA, in accordance with applicable ARARs.

6.5.5 Disposal procedure for waste containing other radionuclides:

A. Drilling mud and cuttings are considered to have no LLNL-added radioactivity if the alpha activity is <15 pCi/g soil and the beta activity is <25 pCi/g:

Dispose of drill cuttings (1) at the ground surface near the well site, (2) as fill, or (3) in the designated disposal area. If cuttings are disposed of near the well site, spread cuttings out as much as is practical. When appropriate, discharge drilling mud to a pit or sump with a minimum of 2 ft of freeboard (Site 300) or 1 ft of freeboard (Livermore Site). For off-site drilling activities, transport drill cuttings and mud on site for disposal in the designated disposal area.

B. Drilling waste are considered to have rad added if the alpha activity is >5 pCi/g soil and the beta activity is >25 pCi/g:

Dispose of IDW as determined by HWM, in consultation with the appropriate EA.

6.5.6 Disposal procedure for waste containing high explosives (HE):

There are no Federal or State criteria for establishing hazardous concentrations of HE compounds in soil. However, using the *Designated Level Methodology for Waste Classification and Cleanup Determination* (Marshack, 1989), LLNL Site 300 has established Designated Levels (DLs) for Cyclotetramethylene-Tetranitramine (HMX) and Cyclotrimethylene-Trinitramine (RDX). The DLs are the concentrations above which a soil may result in degradation of underlying ground water quality. The disposal criteria used are based upon a toxicological literature review presented in Reference 3.5.

A. Drilling waste <31.5 ppm RDX and <315.0 ppm HMX:

Dispose of mud, cuttings, and unused core samples on ground surface at well site.

B. Drilling waste >31.5 ppm RDX and/or >315.0 ppm HMX:

Treat or dispose of waste appropriately as determined by HWM and the appropriate EA.

6.5.7 Disposal procedure for waste containing other detectable contaminants or multiple contaminants:

Dispose of IDW as determined by HWM, in consultation with the appropriate EA.

6.6 Site Restoration

6.6.1 As soon as drilling and, if applicable, well installation has been completed, restore the area to predrilling conditions.

6.6.2 Till drill cuttings and unused soil core left at the well site with the native topsoil so that the nutrients and seed bank within the topsoil is introduced to the cuttings.

6.6.3 Leave a minimum of 2 ft of freeboard in the pit after depositing the drilling mud. The pit should be filled as soon as possible to minimize the amount of time the excavation is open.

6.6.4 Allow a sufficient amount of time for the drilling mud to solidify (one to many months), depending on the season and amount of precipitation.

6.6.5 After drilling mud has solidified, cover the hardened mud with the topsoil that was removed prior to excavation. The site should return to predrilling appearance after the vegetation has been re-established.

6.7 Procedure Exceptions

In developing this SOP, every effort was made to ensure compliance with all ARARs, as required in EPA, 1991. But as recognized in EPA, 1991, it is often necessary to use the best professional judgment, in light of site-specific conditions. Any deviations from this procedure must be approved by the Division Leader or designee only after it is determined that such actions are still protective of human health and the environment.

7.0 QUALITY ASSURANCE RECORDS

7.1 Borehole/Well Construction Log

7.2 Document Control Logbook

8.0 ATTACHMENT

Attachment A— Livermore Site and Site 300 ARARs

Attachment A

Potential Federal, State, and Local ARARs Table

Attachment A. Potential Federal, State, and local ARARs.

ARAR	Comments	LLNL actions taken to comply with ARARs
Federal		
1. Clean Air Act (CAA) [42 USCA 7401–7642] [40 CFR 50–69]	National primary and secondary ambient air quality standards (NAAQS) are defined under Section 109 of the CAA and are listed in 40 CFR 50.	Soils do not contain contaminants regulated under NAAQS.
2. Clean Air Act [42 USCA 7412] [40 CFR 61.92]	National Emission Standards for Hazardous Air Pollutants (NESHAPs) are specific to industrial emissions. 40 CFR 61.92 limits emissions of radionuclides to those amounts that would cause any member of the public to receive, in any one year, a maximum effective dose equivalent of 10 millirems per year (mrem/y).	Aeration of tritiated soils does not exceed dose limits.
3. Land Disposal Restrictions (LDRs) RCRA [40 CFR 268]	Any waste placed in land-disposal units must comply with LDRs by either attaining specific performance or technology-based standards.	Aeration of contaminated soils near boring in area of contamination is not considered "placement" under LDR restrictions, and is consistent with final site remedy.
State		
4. Hazardous Waste Control Act (Health and Safety Code, Section 25100– 25395), CCR, Title 22, ch. 30: Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes	HCWA controls hazardous wastes from their point of generation through accumulation, transportation, treatment, storage, and ultimate disposal. All potentially hazardous materials are handled in accordance with standard chain-of-custody procedures. These requirements are, therefore, applicable to all treatment alternatives.	All soil, other than VOC-containing soil, determined to be hazardous waste will be submitted to LLNL's Hazardous Waste Management Division for proper disposal following all applicable regulations. VOC-contaminated soil will be aerated in area of contamination.
Criteria for Identifying Hazardous Wastes [Title 22, ch. 30, 66693–66776]	Tests for identifying hazardous characteristics are set forth in these regulations.	All soil, other than VOC-containing soil, determined to be hazardous waste will be submitted to LLNL's Hazardous Waste Management Division for proper disposal following all applicable regulations. VOC-contaminated soil <10 ppm will be aerated in area of contamination.

Attachment 1. (Continued)

ARAR	Comments	LLNL actions taken to comply with ARARs
Persistent and Bioaccumulative Toxic Substances [Title 22, ch. 30, 66699]	Total Threshold Limit Concentrations (TTLCs) and Soluble Threshold Limit Concentrations (STLCs) have been established for selected toxics to be used in establishing whether waste is hazardous. If a chemical is either listed or tested and found hazardous, then remedial actions must comply with the hazardous waste requirements under Title 22.	All soil, other than VOC-containing soil, determined to be hazardous waste will be submitted to LLNL's Hazardous Waste Management Division for proper disposal following all applicable regulations. VOC-contaminated soil <10 ppm will be aerated in area of contamination.
5. Porter-Cologne Water Quality Control Act [WC13000–13806], as administered by the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Board (RWQCB) under CCR Title 23, subch. 15, 1050–2836.	Establishes authority for State and Regional Water Boards to determine site-specific discharge requirements and to regulate disposal of waste to land.	Aeration of contaminated soils comply with substantive sections of these regulations due to low volume of contaminants.
6. Fish and Game Regulations on Pollution	Prohibits water pollution with any substance or material deleterious to fish, plant, or bird life.	Aeration of contaminated soils in area of contamination will not result in water pollution deleterious to biota.
7. Air Resources Act (Health and Safety Code, section 3900 et. seq.)	Establishes allowable discharge standards for point sources within each air pollution control district, and establishes ambient air quality standards.	Aeration of contaminated soils comply with substantive sections of these regulations due to low volume of contaminants.
8. Bay Area Air Quality Management District (8-40-112; 8-40-205) San Joaquin County Air Pollution Control District (409.9)	Requires permitting of VOC air discharges (e.g., from an air-stripping unit).	Soil that is removed for sampling purposes is exempt.
9. Central Valley Regional Water Quality Control Board Designated Level Methodology	Provides guidance in establishing acceptable levels of soil contamination which will not impact ground or surface waters.	Methodology used to establish RDX and HMX designated levels.

Attachment 1. (Continued)

ARAR	Comments	LLNL actions taken to comply with ARARs